The Traveling Libby Legacy

Minnesota Community Exhibits Nonoccupational Health Impacts Consistent with Asbestos Damage

Archival photo of children playing on waste rock at the WM/WRG plant.

Minnesota Department of Health

Adverse health effects of asbestos have been documented worldwide for the better part of the last half-century, with a large number of studies focused on occupational exposures received during the mining and processing of vermiculite ore. A new study reports on nonoccupational health effects resulting from community exposures to Libby vermiculite ore processed at the Western Minerals/W.R. Grace (WM/WRG) facility in Minneapolis, Minnesota [***EHP* 120(1):44–49; Alexander et al.**].

The WM/WRG plant is located in a residential neighborhood that includes a mix of single- and multifamily homes as well as schools and churches. During its years of operation from 1938 to 1989, residents were allowed to haul away waste rock for use in their yards, and children played on piles of waste rock outside the plant.

Previous studies indicated an association between changes in lung function––a risk factor for asbestos-related disease—in children who reported playing on piles of waste rock in Libby, Montana, where this vermiculite ore was mined. In the current study, researchers analyzed radiographs of the lungs of 461 Minneapolis community members who were at risk for exposure to the WM/WRG vermiculite prior to 1980 (this date ensured an adequate latency period for any asbestos-related effects to manifest). The participants were part of the original Northeast Minneapolis Community Vermiculite Investigation cohort initiated by the Minnesota Department of Health and the U.S. Agency for Toxic Substances and Disease Registry.

Participants' background asbestos exposures were estimated by coupling residential history with air dispersion and deposition models of the asbestos emitted from the plant when it was in operation. The researchers also asked participants about activity-based routes of exposure, such as having played as a child on the piles of waste rock outside the plant.

Nearly half the participants reported engaging in at least one activity that brought them into contact with the waste material, and 39% reported having played on the waste rock piles. Radiographic evidence showed a 10.8% prevalence of pleural abnormalities consistent with pneumonoconiosis—evidence of asbestos-induced changes in the lungs—as determined by consensus of two radiologists certified to evaluate X rays for the effects of asbestos. Participants with pleural abnormalities were more likely to be male and were older, and those who reported frequently playing on waste rock piles had twice the prevalence of pleural abnormalities compared with those who reported never playing there. Pleural abnormalities also were more strongly associated with cumulative exposure estimated to have been acquired over many years than with higher intermittent peak exposures.

Study limitations included small population size, imprecise estimations of activities leading to exposure, and analysis of only a single chest radiograph for each study subject. However, the results suggest that health effects associated with asbestos exposure may occur at lower levels than previously believed, pointing to the need for further research on the effects of long-term, low-level, and nonoccupational asbestos exposures.

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Mixed Metals Toxicity

More than the Sum of Its Parts?

Most toxicologic studies focus on one chemical or toxicant at a time, although in the real world people are exposed to multiple substances at once. Metals, for example, are commonly found in combinations in air, water, and food. Now researchers have conducted a prospective epidemiologic study to examine neurodevelopmental effects of manganese–lead coexposure [***EHP* 120(1):126–131; Claus Henn et al.**].

The study included 455 children enrolled at birth in a Mexico City longitudinal cohort study, who were followed until 36 months of age. The researchers measured blood levels of lead and manganese at 12 and 24 months of age. Cognitive, motor, and language development were assessed every 6 months from 12 to 36 months of age using the Bayley Scales of Infant Development–II. Both lead and manganese exert their toxic effects on child development primarily through the central nervous system.

Exposure to manganese and lead simultaneously was associated with greater deficits in both mental and psychomotor development than expected based on the estimated effects of exposure to either metal alone; this is consistent with a synergistic effect on neurodevelopment. Associations were greatest at 12 months, where Mental Development Index scores were 2.16 points lower per 1-unit increase in blood lead among children with high manganese compared with children with midrange manganese. Psychomotor Development Index scores at 12 months were 0.97 points lower per 1-unit increase in blood lead among children with high manganese compared with children with midrange manganese. The authors suggest that the developmental period up to 12 months may be particularly sensitive to this interaction.

The differences in mental and psychomotor development scores were small for individuals, but the authors write that these differences may have population-level consequences if they cause the entire distribution of neurodevelopment scores to shift. This would increase the number of children eligible for diagnosis with neurodevelopmental problems (who would then require treatment) as well as decrease the average IQ.

The study's strengths include a stable study population with little attrition as well as the repeated measurements of neurodevelopment between 12 and 36 months, which allowed the researchers to evaluate associations over time and offered greater statistical power than cross-sectional analyses. Weaknesses of the study included the lack of formal exposure assessment, which means the sources of metal exposure were unknown. In addition, the neurodevelopment test instruments used in the study were not normalized to the Mexican population, so the resulting scores are relatively low compared with the expected mean score of 100 in a U.S. population and cannot be generalized to other populations.

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